FIGHTING TO FEED AND BREATHE: NEMALINE MYOPATHY IN AN INFANT

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INTRODUCTION:

Nemaline Myopathy (NM) is a slow, progressive disease impairing muscle contraction.[1] NM affects the thin filament of sarcomeres of skeletal muscle, which is necessary for muscle contraction. Manifestations include hypotonia, difficulties feeding, and respiratory dysfunction.[1,2] Diagnosis is made via:

- Nemaline bodies on muscle biopsy
- elevated CK
- genetic panel.[1,3,4]

CASE DESCRIPTION:

AS is a 6-day-old female fraternal twin presenting for issues latching and sucking. Her 2-week well visit found jaundice, failure to thrive (FTT), "doughy" musculature, low tone to extremities, yet appropriate trunk strength. She presented again at 3 weeks for weakness and recurrent aspirations, leading to a hospital admission. After discharge and for weeks following, she had continued hypoxia with feedings. At 2.5mo, diffuse hypotonia, constipation, and torticollis were noted, along with continued FTT, warranting nutrition consult. A G-tube was placed, increasing weight while reducing frequency and severity of aspiration episodes. An official diagnosis of NM was made, despite an abnormally low CK, via genetic panel at 8mo and muscle biopsy at 13mo.

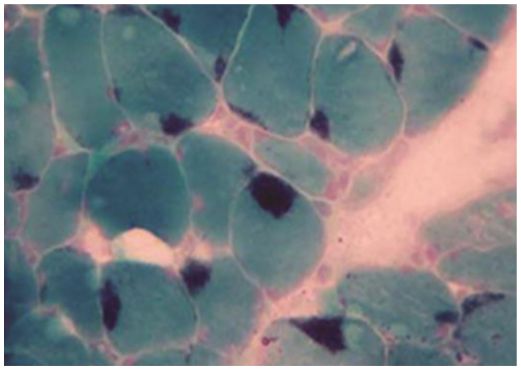

Figure 1. Muscle biopsy using modified Gomori trichome (MGT) staining. Dark blue rod-like structures are known as "nemaline rods," which is pathognomonic for nemaline myopathy.

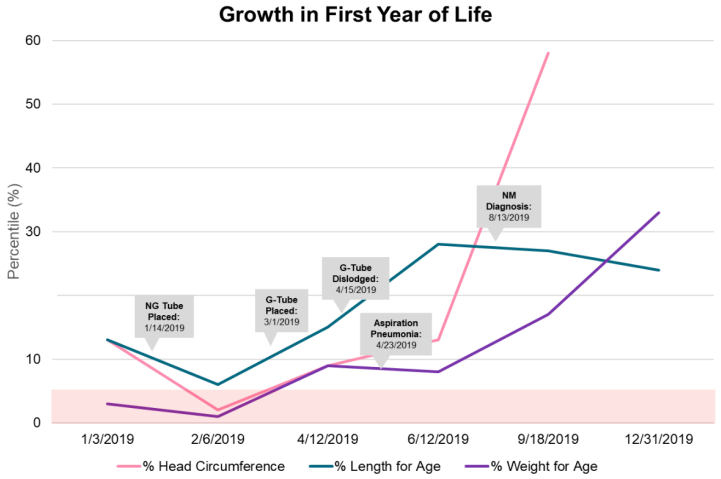

Figure 2. Growth progress from first signs and symptoms through our patient's diagnosis of Nemaline Myopathy.

OUTCOME AND FOLLOW-UP:

At 13-months, patient continues regular G-tube feeds with continued weight gain and few aspirations. She is followed by primary care and UNC specialists including feeding team, speech, pediatric surgery, pediatric pulmonology, pediatric ENT, pediatric neurology, genetics, and has been referred to a MDA neurologist.

	Congenital Nemaline Myopathy (NM)	Small Muscular Atrophy (SMA)	Duchenne Muscular Dystrophy (DMD)
Incidence	1 per 50,000 live births	4-10 per 100,000 live male births	13-21 per 100,000 live births
Age	Infant or young child	At birth or first 6mo	2-3yo
Presentation	Muscle weakness, floppy Respiratory distress, frequent aspiration Feeding challenges	Weakness and hypotonia, especially lower extremities, floppy Areflexia Progress to respiratory failure	Proximal and LE weakness Late walker Pseudohypertrophy of calf Growth delay, short stature Dilated cardiomyopathy
Diagnostics	Muscle biopsy: Pathognomonic nemaline rods Genetic testing CK normal or slightly elevated	Genetic testing Electromyography and muscle biopsy no longer standard CK normal or slightly elevated	Genetic testing Electromyography, muscle biopsy Elevated CK (1000s or 10,000s)

Figure 3. Comparison of congenital myopathies that present within early development.[5,8,9]

DISCUSSION:

- Classic findings of nemaline myopathy includes: hypotonia, feeding challenges, and breathing difficulties.[6]
- Differential diagnosis of FTT includes but is not limited to: prematurity, short gut syndrome, neglect, myopathies, cystic fibrosis.
- CK level was abnormally low in our patient, compared to a classical NM presentation.[1,3]
- New therapies are being established.[3]

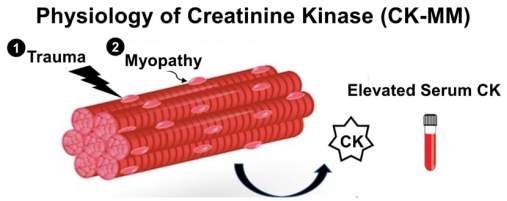

Figure 4. Illustration of two forms of pathologic creatinine kinase release.[10]

CONCLUSION:

NM is a rare condition, affecting 1 in 50,000.[5] Supportive therapy is offered to improve quality of life and survivorship with management similar for patients with other tone disorders including DMD and SMA.[3,4] While there are no cures at this time, there are currently new therapies being established.[6]

REFERENCES:

1. Wallgren-Pettersson, C. (2002, June). Nemaline and Myotubular Myopathies. Seminars in Pediatric Neurology, 9(2), 132-144.
2. Lindqvist, J., Cheng, A., Renaud, G., Hardeman, E., & Ochala, J. (2013, June). Distinct Underlying Mechanisms of Limb and Respiratory Fiber Weaknesses in Nemaline Myopathy. Journal of Neuropathology, 72(6), 472-481.
3. Wallgren-Pettersson, C., Sewry, C., Nowak, K., & Laing, N. (2011). Nemaline Myopathies. Seminars in Pediatric Neurology, 230-238.
4. Yunfeng, X., P, M., J, W., & E, B. (2017, May). Craniofacial Manifestations In Nemaline Myopathy. Journal of Craniofacial Surgery, 28(3), 258-260.
5. National Institute of Health: Genetics. (2020, January 21). Nemaline Myopathy. Retrieved from National Institute of Health Genetics Home Reference: https://ghr.nlm.nih.gov/condition/nemaline-myopathy#
6. Nguyen, M., Joya, J., Kee, A., Yang, N., Hook, J., Lemckert, F., Hardeman, E. (2011, November). Hypertrophy and Dietary Tyrosine Ameliorate the Phenotypes of a Mouse Model of Severe Nemaline Myopathy. Brain: A Journal of Neurology, 3516-3529.
7. Bodamer, Olaf A. "Congenital Myopathies." UpToDate, 6 Feb. 2019.
8. Darris, Basil T. "Duchenne and Becker Muscular Dystrophy: Clinical Features and Diagnosis." UpToDate, 13 Feb. 2020.
9. "Duchenne Muscular Dystrophy." National Organization for Rare Disorders.
10. Muscle structure - Muscle Under the Microscope. (2020). Retrieved 10 March 2020.